

FIG. 1

CENTER OF PERFECT CIRCLE

ROAD SHAPE (PERFECT CIRCLE)

LINE APPROXIMATE ERROR $Er(m)$

FIG. 2

ROAD SHAPE

RESAMPLE SHAPE

Fig. 3

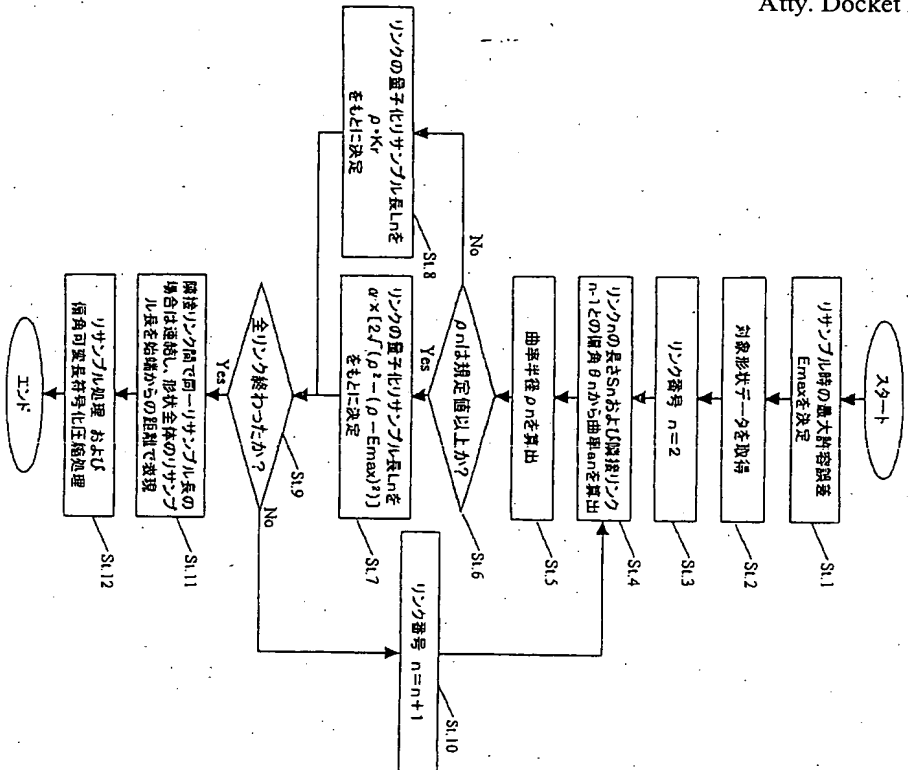
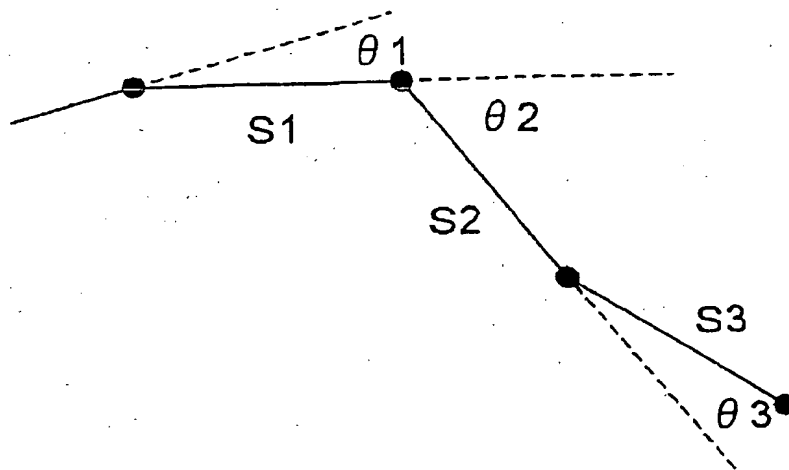


FIG. 3

START

- St. 1 DETERMINE MAXIMUM ALLOWABLE ERROR Emax AT RESAMPLE TIME
- St. 2 ACQUIRE OBJECT SHAPE DATA
- St. 3 LINK NUMBER n=2
- St. 4 CALCULATE AN FROM LENGTH Sn OF LINK n AND DEFLECTION ANGLE θn WITH ADJACENT LINK n-1
- St. 5 CALCULATE CURVATURE RADIUS ρn
- St. 6 IS ρn EQUAL TO OR GREATER THAN STIPULATED VALUE?
- St. 7 DETERMINE QUANTIZATION RESAMPLE LENGTH ln OF LINK BASED ON $\alpha \times (2 (\rho^2 - (\rho - Emax)^2))$
- St. 8 DETERMINE QUANTIZATION RESAMPLE LENGTH ln OF LINK BASED ON $p \cdot kt$
- St. 9 END OF ALL LINKS
- St. 10 LINK NUMBER n=n+1
- St. 11 IF SAME QUANTIZATION RESAMPLE LENGTH IS APPLIED BETWEEN ADJACENT LINKS, JOIN LINKS AND REPRESENT RESAMPLE LENGTH OF WHOLE SHAPE BY DISTANCE FROM BEGINNING
- St. 12 PERFORM RESAMPLE PROCESSING AND DEFLECTION ANGLE VARIABLE-LENGTH CODING COMPRESSION PROCESSING
- END

[図4] Fig. 4



[図5] Fig. 5

ANGLE BETWEEN TANGENTS, $\Delta\omega$
 (IN RADIAN UNITS)

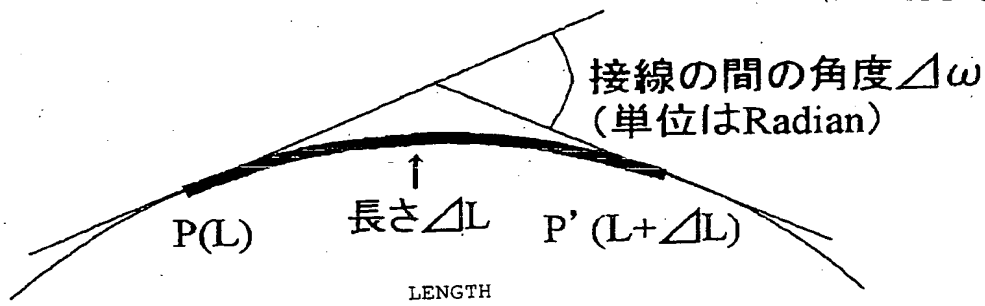


Fig. 6 [図6]

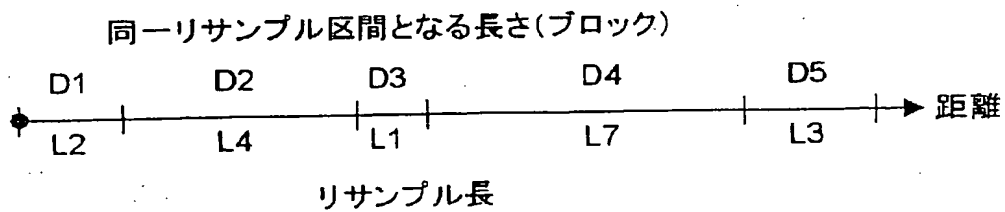


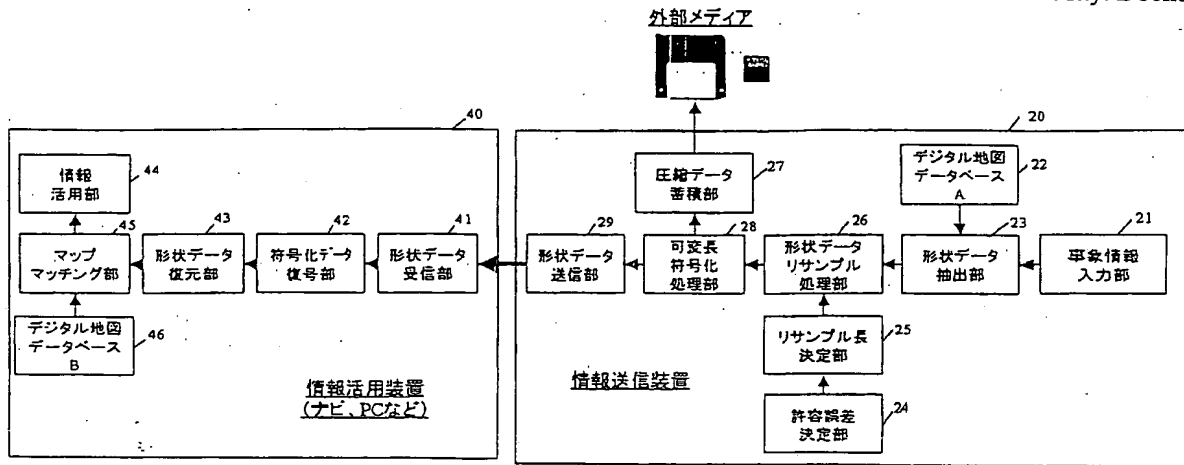
FIG. 6

LENGTH (BLOCK) AS THE SAME RESAMPLE ZONE

DISTANCE

RESAMPLE LENGTH

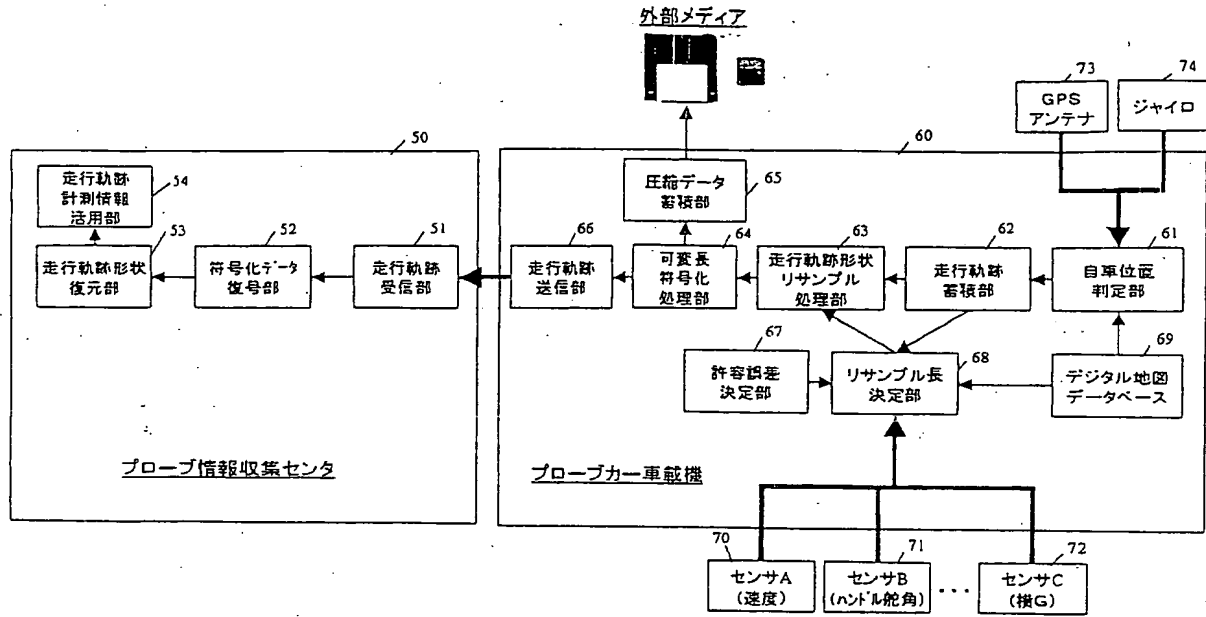
FIG. 7



4/13

FIG. 7

- 20 INFORMATION TRANSMISSION APPARATUS
- 21 EVENT INFORMATION INPUT SECTION
- 22 DIGITAL MAP DATABASE A
- 23 SHAPE DATA EXTRACTION SECTION
- 24 ALLOWABLE ERROR DETERMINATION SECTION
- 25 RESAMPLE LENGTH DETERMINATION SECTION
- 26 SHAPE DATA RESAMPLE PROCESSING SECTION
- 27 COMPRESSED DATA STORAGE SECTION
- 28 VARIABLE-LENGTH CODING PROCESSING SECTION
- 29 SHAPE DATA TRANSMISSION SECTION
- 40 INFORMATION UTILIZATION APPARATUS (NAVIGATION SYSTEM, PC, ETC.)
- 41 SHAPE DATA RECEPTION SECTION
- 42 CODED DATA DECODING SECTION
- 43 SHAPE DATA RECONSTRUCTION SECTION
- 44 INFORMATION UTILIZATION SECTION
- 45 MAP MATCHING SECTION
- 46 DIGITAL MAP DATABASE B
- A. EXTERNAL MEDIUM



5/13

FIG. 8

- 50 PROBE INFORMATION COLLECTION CENTER
- 51 RUN LOCUS RECEPTION SECTION
- 52 CODED DATA DECODING SECTION
- 53 RUN LOCUS SHAPE RECONSTRUCTION SECTION
- 54 RUN LOCUS AND MEASUREMENT INFORMATION UTILIZATION SECTION
- 60 PROBE CAR INSTALLED MACHINE
- 61 HOME VEHICLE POSITION DETERMINATION SECTION
- 62 RUN LOCUS STORAGE SECTION
- 63 RUN LOCUS SHAPE RESAMPLE PROCESSING SECTION
- 64 VARIABLE-LENGTH CODING PROCESSING SECTION
- 65 COMPRESSED DATA STORAGE SECTION
- 66 RUN LOCUS TRANSMISSION SECTION
- 67 ALLOWABLE ERROR DETERMINATION SECTION
- 68 RESAMPLE LENGTH DETERMINATION SECTION
- 69 DIGITAL MAP DATABASE B
- 70 SENSOR A (SPEED)
- 71 SENSOR B (STEERING WHEEL RUDDER ANGLE)
- 72 SENSOR C (LATERAL G)
- 73 GPS ANTENNA
- 74 GYRO
- A. EXTERNAL MEDIUM

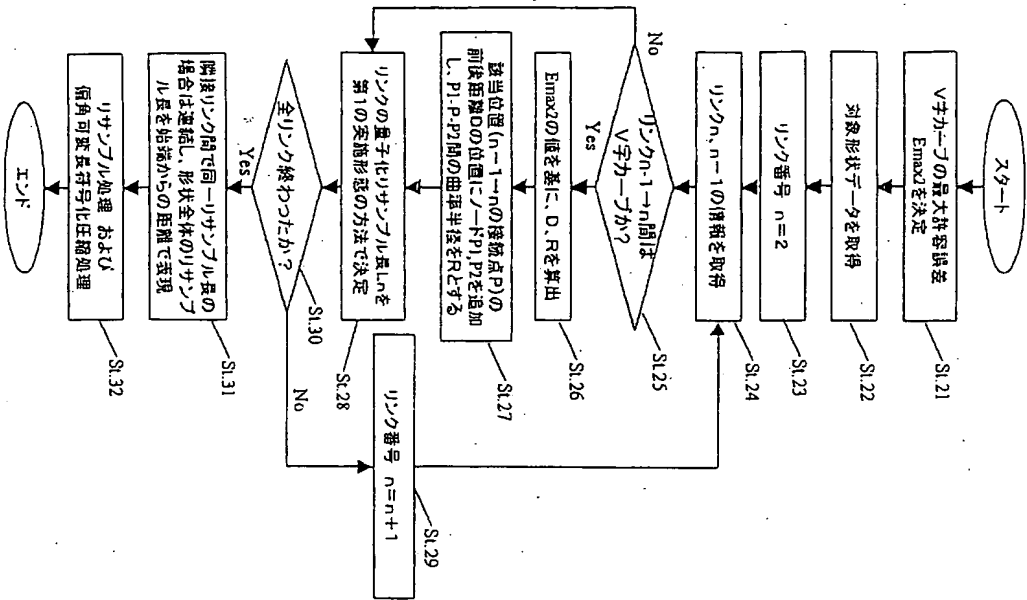


FIG. 11

START

St.21 DETERMINE MAXIMUM ALLOWABLE ERROR E_{max2} OF V-SHAPED CURVE

St.22 ACQUIRE OBJECT SHAPE DATA

St.23 LINK NUMBER $n=2$

St.24 ACQUIRE LINK n , $n-1$ INFORMATION

St.25 V-SHAPED CURVE BETWEEN LINKS n AND $n-1$?

St.26 CALCULATE D AND R BASED ON VALUE OF E_{max2}

St.27 ADD NODES $P1$ AND $P2$ TO POSITION AT DISTANCE D FROM CORRESPONDING POSITION (CONNECTION POINT P OF $(n-1)$ AND n),

AND SET CURVATURE RADIUS OF $P1 \rightarrow P \rightarrow P2$ TO R

St.28 DETERMINE QUANTIZATION RESAMPLE LENGTH l_n OF LINK ACCORDING TO METHOD OF FIRST EMBODIMENT

St.29 LINK NUMBER $n=n+1$

St.30 END OF ALL LINKS

St.31 IF SAME QUANTIZATION RESAMPLE LENGTH IS APPLIED BETWEEN ADJACENT LINKS, JOIN LINKS AND REPRESENT RESAMPLE LENGTH OF WHOLE SHAPE BY DISTANCE FROM BEGINNING

St.32 PERFORM RESAMPLE PROCESSING AND DEFLECTION ANGLE VARIABLE-LENGTH CODING COMPRESSION PROCESSING

END

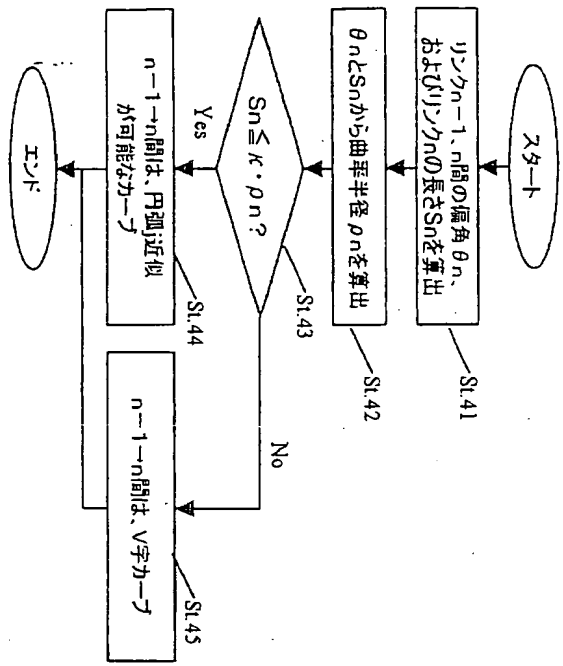


FIG. 12

START

St.41 CALCULATE DEFLECTION ANGLE θ_n BETWEEN LINKS (n-1) AND n AND LENGTH S_n OF LINK n

St.42 CALCULATE CURVATURE RADIUS ρ_n FROM θ_n AND S_n

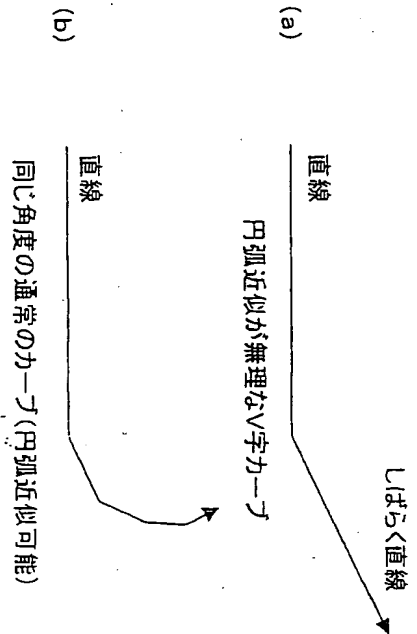
St.43 $S_n \leq \kappa \cdot \rho_n$?

St.44 DETERMINE THAT (n-1) -> n IS CURVE THAT CAN BE MADE APPROXIMATE TO CIRCULAR ARC

St.45 DETERMINE THAT (n-1) -> n IS V-SHAPED CURVE

END

FIG. 13



(a)

LINE

LINE FOR A WHILE

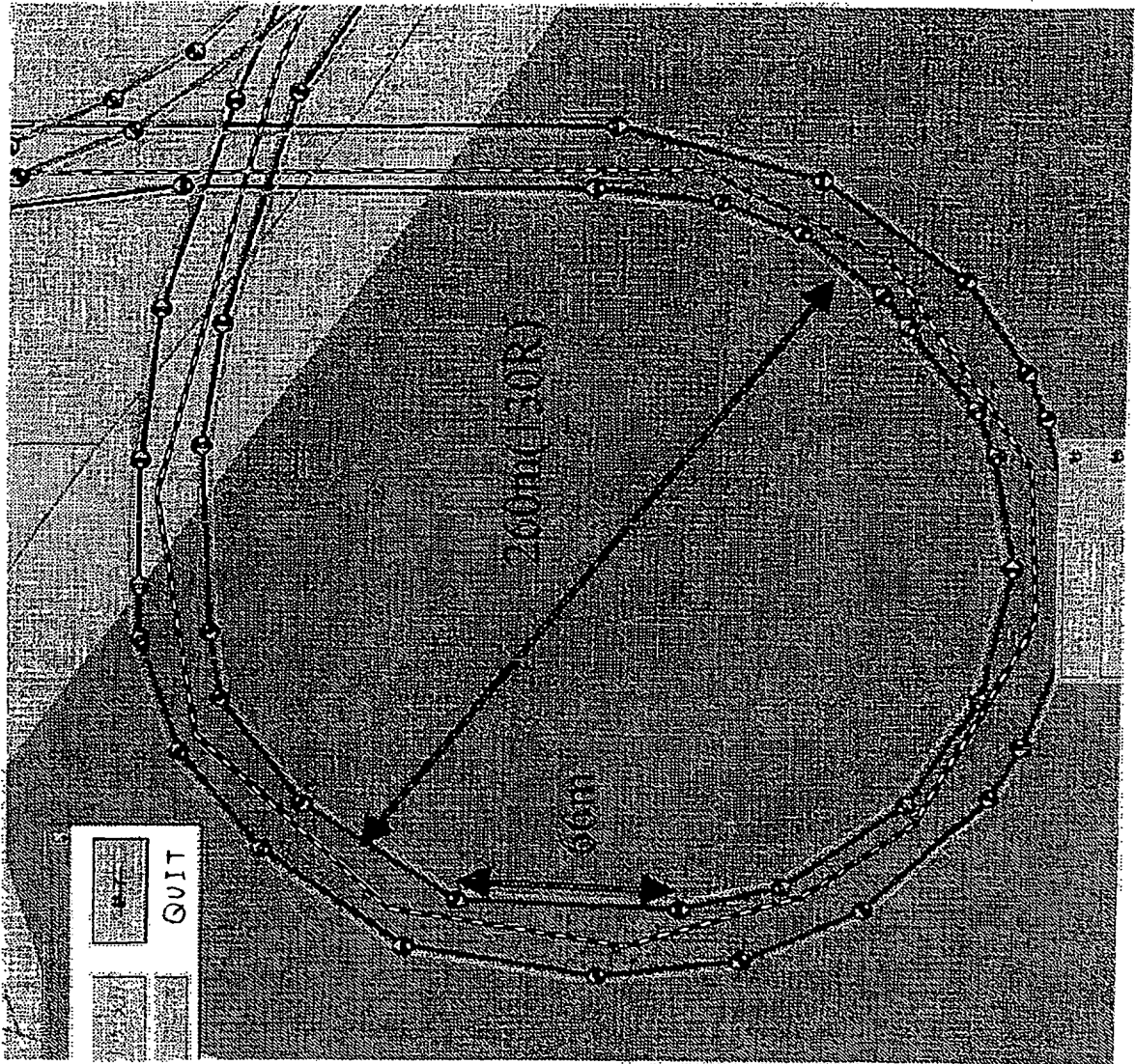
V-SHAPED CURVE THAT CANNOT BE MADE APPROXIMATE TO CIRCULAR ARC

(b)

LINE

USUAL CURVE AT THE SAME ANGLE (THAT CAN BE MADE APPROXIMATE TO CIRCULAR ARC)

[Fig. 14] Fig. 14



[図15] Fig. 15

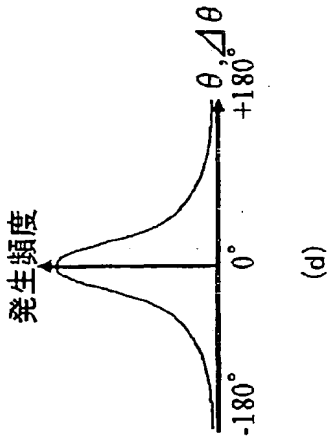
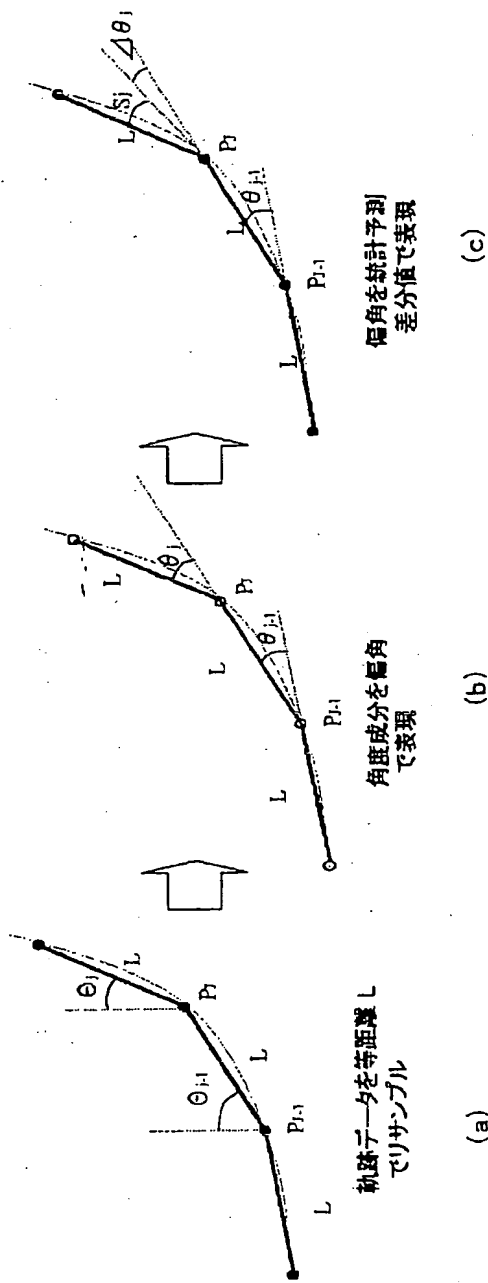


FIG. 15

RESAMPLING OF LOCUS DATA AT EQUAL DISTANCE L

(a)

REPRESENTING OF ANGLE COMPONENT BY DEFLECTION ANGLE

(b)

REPRESENTING OF DEFLECTION ANGLE BY PREDICTED DIFFERENCE VALUE

(c)

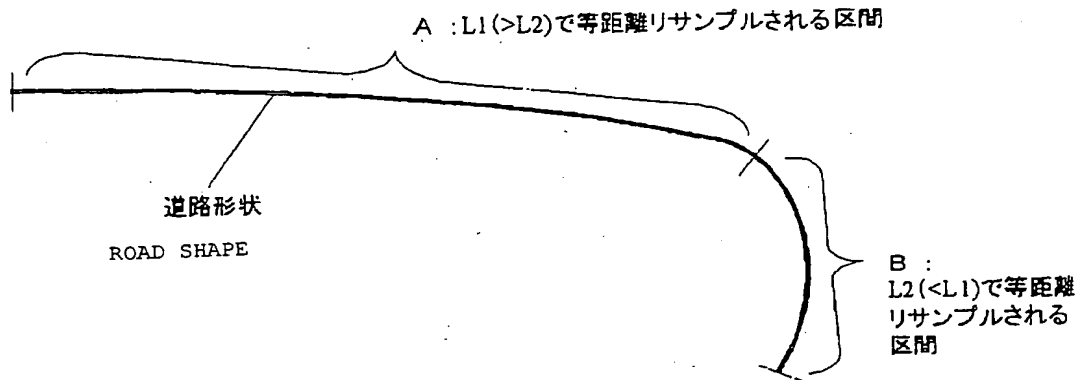
OCCURRENCE FREQUENCY

(d)

11/13

[~~図16~~] Fig. 16

A: EQUAL-DISTANCE RESAMPLE ZONE AS $L1 (>L2)$



[~~図17~~] Fig. 17

B: EQUAL-DISTANCE RESAMPLE ZONE AS $L2 (<L1)$

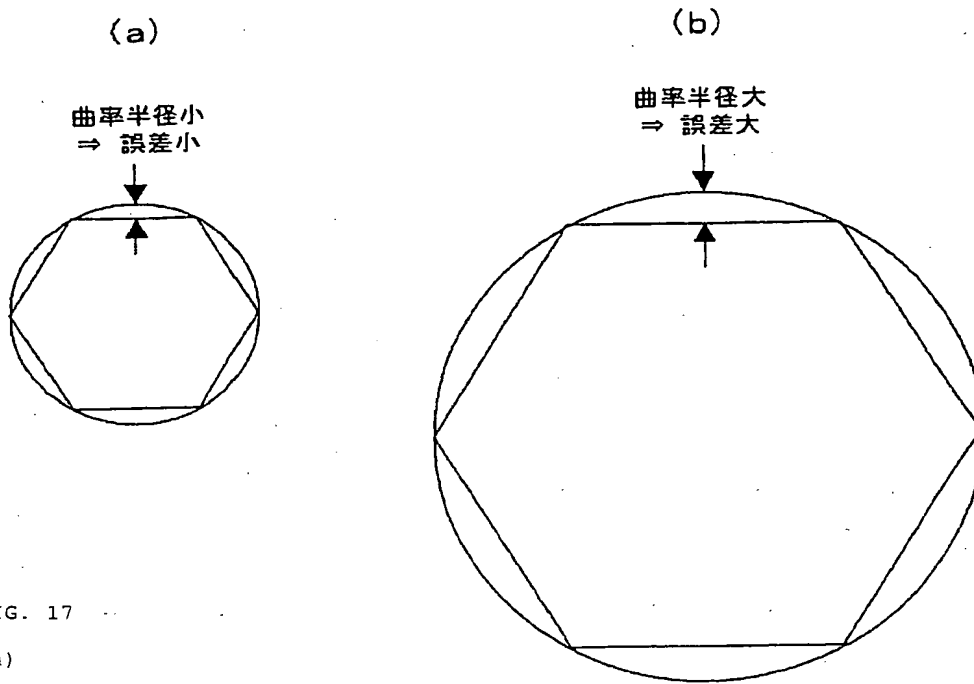


FIG. 17

(a)

CURVATURE RADIUS IS SMALL

-> ERROR IS SMALL

(b)

CURVATURE RADIUS IS LARGE

-> ERROR IS LARGE

[18] Fig. 18

FIG. 18

RESAMPLE SHAPE

ROAD SHAPE

リサンプル形状

道路形状

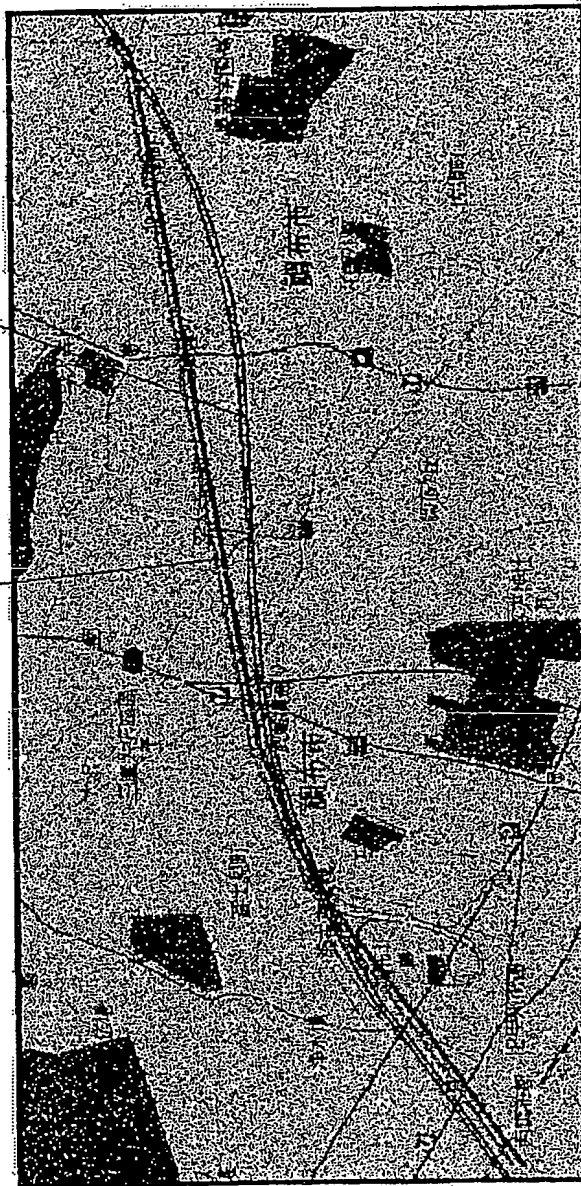
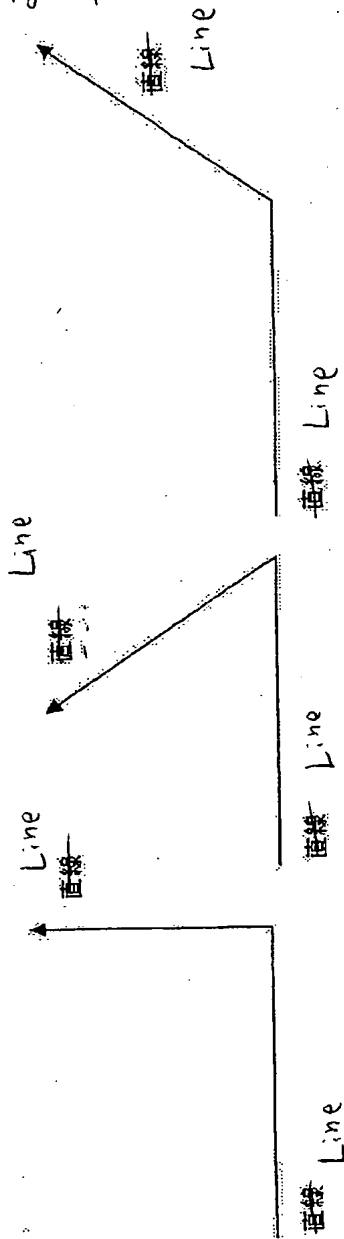


Fig. 19



(c)

(b)

(a)